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Hugh R. Bennett
reports on **SOUTH AFRICA**

AUGUST 1945

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

SOIL CONSERVATION

CLINTON P. ANDERSON
SECRETARY OF AGRICULTURE

HUGH H. BENNETT
CHIEF, SOIL CONSERVATION SERVICE

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Afrikander ox drinking water, Rust-der-Winter, South Africa.

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BETTER DIET THROUGH SOIL CONSERVATION

By Howard R. Tolley

Investigations of the American diet have revealed some unpleasant facts. In spite of what we frequently boast of as "the highest standard of living in the world," a large percentage of our people have never known the satisfactions they might have enjoyed through an adequate diet. Many have never had enough food; many more have never known what it means to have the proper food. In 1936, for example, less than one-fifth of the families of the nation had diets which measured up to all the allowances recommended by the National Research Council for good nutrition. As might have been expected, the greatest percentage of families attempting to live on poor diets were among the low-income groups.

Even in times of full employment and high national income, the American diet has not been ideal. A second survey, made in 1942, showed some improvement over 1936—and it is even possible that conditions have improved a little since then, in spite of rationing and wartime shortages—but neither survey indicates any reasons for complacency, though demonstrating that adequate income alone does not automatically insure a

proper diet. It was found, for example, even in the highest income groups in urban communities that one family in ten was subsisting on a poor diet,



Howard R. Tolley

NOTE.—The author is Chief, Bureau of Agricultural Economics, Washington, D. C.

and only one-half had diets which could be rated better than fair.

However, if a high level of national income alone will not entirely settle the problem of seeing that every American has an adequate diet, it does go a long way toward getting it settled, whereas a low national income goes a very long way toward increasing the problem. One of the first effects of a falling income upon national spending is to reduce the per capita consumption of such important high protein, mineral, and vitamin content foods as meats, poultry, dairy products, and eggs. For these foods are substituted cheaper and bulkier products which, though more exhausting to the soil in their production, do not adequately replace the animal products in human nutrition. It has been estimated that per capita consumption of meats and poultry might vary about 35 pounds (retail weight), and of milk about 100 pounds, under conditions of full employment and depression.

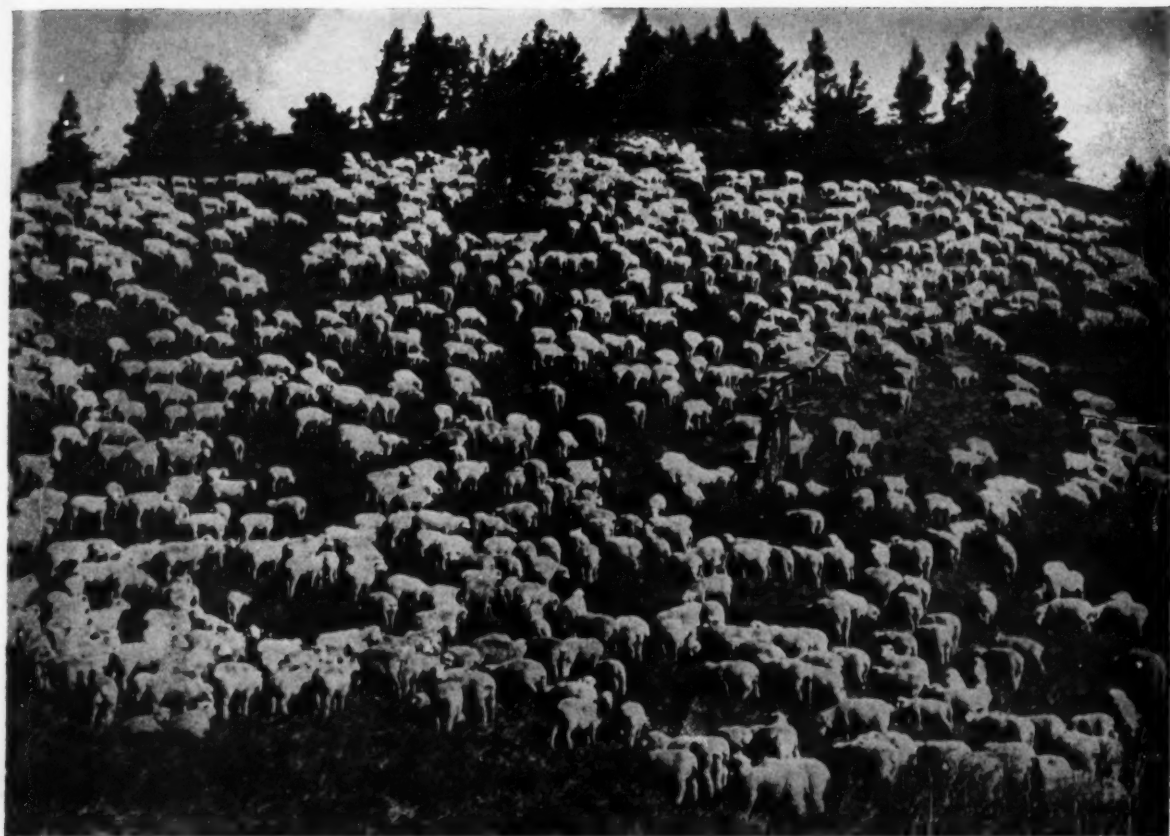
This is not the whole story, unfortunately. Not only do the farmers of the nation sell fewer

pounds of livestock products during depressions—what they do sell has to be disposed of at considerably reduced prices per pound. Consequently, the farmers are hit harder by depression than are non-farm people. This is demonstrated by the fact that while, in 1929, the total income of persons on farms was equal to about 11 percent of that of persons not on farms, the disparity broadened until, by 1932, it was equal to less than 8 percent. Because people employed in industry and trade had less money to spend, they not only spent a smaller amount on farm products, they actually spent a smaller proportion of a reduced amount on the products the farmers brought to market.

Because his income has been thus reduced, the farmer also has had to cut expenses somewhere. Unfortunately, following the line of the least resistance often has brought him to retrenchment at the expense of his capital investment. In one way or another the bill is passed back to the soil. Either the soil is neglected or soil nutrients are insufficiently returned through enforced economiz-



"Conserving soil resources while at the same time achieving a high level of nutrition."



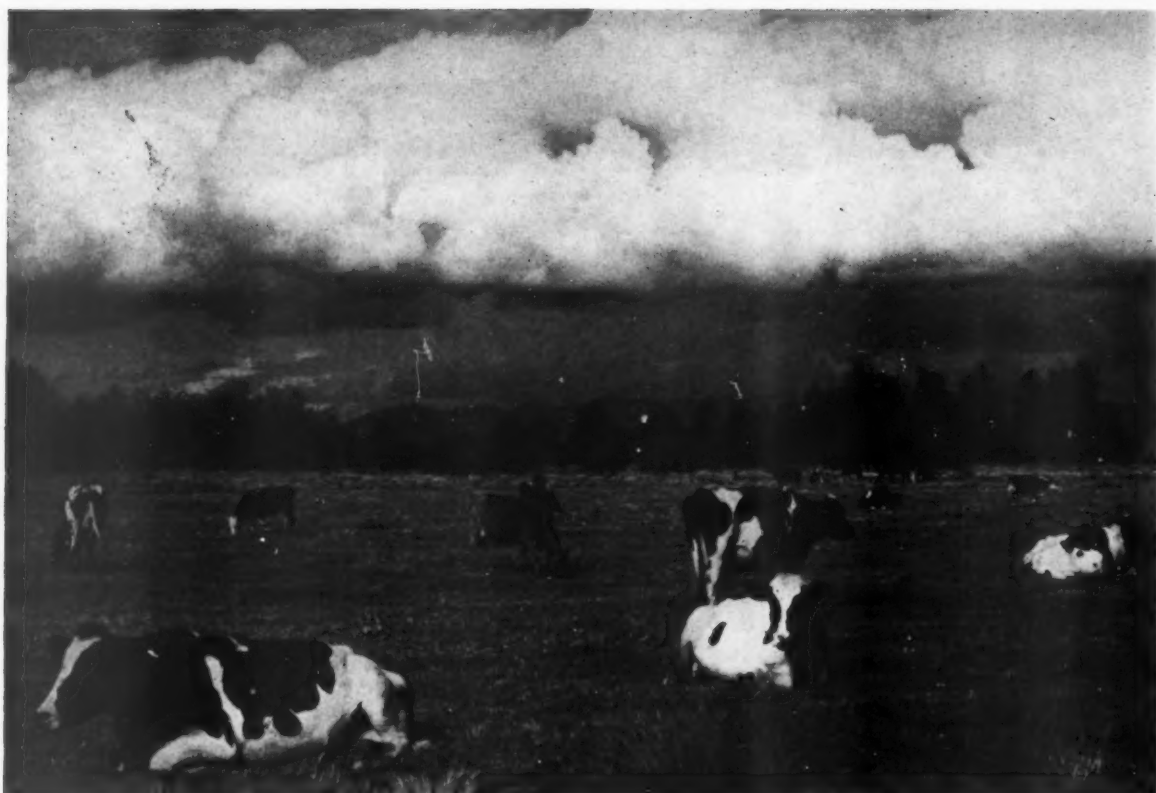
"We shall have to adjust the stocking of these ranges to the number of animals they can safely carry."

ing on fertilizers. Thus the vicious circle is closed, the circle which began with increased depletion of human resources and continued to the ultimate depletion of natural resources. *The experience of depression years should help us to understand that this matter of conservation is not something which goes on in a vacuum, but something which is woven into the fabric of national poverty or prosperity. It points up the moral that to conserve one resource often helps to conserve other resources. It is no new thought, though it is one too easily forgotten, that man and the soil are so intimately related that, speaking broadly, whatever contributes to the good or ill of either has a corresponding influence upon the other.*

If the nation's nutritional needs, as distinguished from market demands, are to be met with anything like a reasonable degree of adequacy, there must be a considerable increase in the production of livestock and dairy products. One of the lessons we have learned from 1936 and 1942 surveys of family food consumption is that 1935-

39 per capita levels of consumption will not satisfy the demands of a proper national diet. During the wartime period, with high wages and full employment, thousands of persons have become accustomed to a diet richer in meats and dairy foods than they have been able to afford in the past. They will not willingly return to a diet greatly deficient in these items. Of course, with the end of the Japanese war and the demobilization of a large part of our military establishment, a much larger share of our livestock and dairy production will be available to civilians than at present. However, if income continues high, production must be kept well above 1935-39 levels to meet demand. Milk production may go to even higher levels if nutritional needs are to be met.

Last year, civilian per capita consumption of all meats went to nearly 150 pounds. Consumption would have been even higher had supplies been available. Consumption of poultry and dairy products also was high, yet consumers likewise would have purchased more of these products had they



"Thousands of persons have become accustomed to a diet richer in dairy foods."

been available. Recent studies made by Bureau of Agricultural Economics show that if the present levels of employment and income can be maintained, the consumption of meats, chickens, turkeys, and dairy products will probably rise, while that of eggs will be but slightly reduced. What is likely to be the effect upon our agricultural system under such conditions?

If anything like this potential consumption is realized, substantial shifts in our cropping systems and changes in some of our farming practices will be definitely called for in the years ahead. Much of the steep and eroded land now in cultivation will need to be retired from soil-depleting uses and seeded to grass. Much relatively level land in many parts of the country will also be affected. Acreages of soil-depleting crops must be reduced and the acreage of soil-conserving crops must be expanded.

In the national interest we should bring a halt to wastage of our soil. And when economically feasible that which is already greatly depleted should be relieved from soil-destructive systems

of utilization and turned to purposes which will enable it to produce its fair quota of products necessary to raising the national level of nutrition. This means—if we are to make the best use of the increased acreages of hay and pasture—that we shall have to adjust the stocking of these ranges to the number of animals they can safely carry without impairment of soil and roughage values. Many of these "new" range lands and hay and pasture lands can best be used to relieve the burden of too many animals on adjacent areas now overstocked. By this means production of livestock products can be increased by giving the animals *now on the range* an opportunity to produce more and better calves, make better steer gains, etc. Beginning at this end of the problem, we close the circle—here again is demonstrated that the conservation of a natural resource can contribute to the conservation of human resources.

It is estimated that by 1950—assuming full employment and a national income of something like 150 billion dollars—we could use an additional 3 percent of beef and veal, and about 9 percent more

milk than we produced in 1943. Because of heavy non-civilian requirements for pork and eggs in 1943, we probably shall not have quite so high a rate of production of these items in 1950, and possibly a little less mutton and lamb. But the demand for all these products can be expected to exceed that of the prewar (1935-39) years considerably. Still assuming full employment and high income for 1950, the estimates exceed 1935-39 levels as follows: Pork, exclusive of lard, would increase by nearly 65 percent, eggs by 30 percent, lamb and mutton by 16 percent, beef and veal by 25 percent, and milk by 24 percent.

If we go a step further and assume strong national programs for conserving our soil resources while at the same time achieving a high level of nutrition for all our people, even higher levels of consumption are possible. Under conditions such as these, we might increase our dairy herds by as much as 5 million head over present levels, in order to produce an estimated 25 billion pounds of milk over the 119 billion pounds estimated for 1944. This would call for large increases in hay acreages, necessitating significant reductions in the acreages of the major soil-depleting feed crops.

Of course, such a highly optimistic outlook is based upon assumptions that are only possibilities. However, it may be well to note that these assumptions are not impossible of realization; they can be turned into actualities. They may be regarded as goals to be shot at. Our accomplishments in the war effort should have convinced us of our ability to attain goals like these when we set ourselves to the job in the conviction that the goals are worthwhile. Under the stimulation of wartime demands, goals that seemed unattainable were not only reached but exceeded. We can do the same with these new goals if we want to.



DISTRICT PROFILE

MARYLAND'S JOHN E. CLARK

The sign on a street door opposite the Bel Air, Maryland, courthouse (built in 1788) reads "John E. Clark, Attorney-at-Law." You climb one flight, turn left and walk into a medium-sized room jammed with desks and filing cases.

It's the most flabbergasting lawyer's office you ever saw. In one corner a mimeograph machine is clattering. Two young girls are busy at a table addressing a pyramid of envelopes. On the walls are photographs of purebred livestock, of contouring and strip cropping. You look for the usual legal library, but it must be concealed by the stacks of agricultural periodicals that occupy every available space. Behind one such stack a tall, blonde fellow in spectacles is talking on the telephone—not about filing a brief in the case of Raftery versus Hooligan, but about the Harford County Horse and Pony Club.

Then you meet the dynamic Clark himself—lawyer, legislator, soil conservationist, writer,

lecturer, organizer, promoter, photographer. After two hours, you go away with very little personal data about this versatile gentleman, for he is one of the very few men you have met who has a genuine "passion for anonymity." But you do carry away the definite impression that here is one of Maryland's most useful citizens. You decide the sign on his door might well read "Agricultural Ambassador and Conservationist at Large." From others you fill in with what you couldn't wheedle out of a man who talks about everything but himself.

You learn, for instance, that he isn't a farmer, although farm reared and a graduate of Maryland's College of Agriculture, Class of '34. He was elected by Harford Countians to the House of Delegates that same year. Since his very first term he has been chairman of the House of Agriculture Committee. In addition to his legislative duties he has been field representative of The State Fair

Board since 1937.

You learn, too, that John Clark is secretary of the Maryland Purebred Society, a group devoted to the export of purebred stock, and for several years has served on the Dairy Advisory Committee of the University of Maryland. You find that he became a lawyer the hard way by commuting to the University of Baltimore five nights a week for three years while serving in the legislature and working for the Fair Board.

As House Agriculture Committee chairman, John Clark is champion of all progressive agricultural and conservation legislation, examples being the Soil Conservation Districts Act of 1937 and the 1943 Forestry Law which sets up stringent regulations governing timber cutting. He is leader of the movement to conserve the state's seafood resources.

As field representative of the State Fair Board John Clark engages in promotional and organizational work all over the state. Nobody knows for sure how many organizations now thriving were originated and nursed through their infancy by the ubiquitous Clark. His articles and photographs, invariably uncredited to him, appear in scads of agricultural journals.

Since he sponsored the Soil Conservation Districts Act in 1937, John Clark has watched districts spread to every corner of the state and has lent a helping hand more than once.

Less than two years ago, at a Friends of the Land conservation forum in Baltimore (he was one of the prime promoters of that, too) John Clark was, as he puts it, "inspired" by a talk by Dr. Bennett and his effective use of colored slides. Checking around Bel Air and other communities, John Clark found that, in general, the townsfolk and the business men, even when they knew a soil conservation district was active in the neighborhood, didn't realize what it meant to them or that they were dependent almost entirely on the topsoil that's still slipping away too fast from the farms of their best customers.

Clark decided he could perform a public service by doing something about this. And so he began taking natural color pictures—he now has over 200—and assembling material. In scores of talks before Rotarians, Kiwanians, Lions, Granges, Chambers of Commerce, Garden Clubs and the like he has hammered across the message that the soil is the lifeblood of the community and its protection is vital to the welfare of every individual. A compelling and energetic speaker, he makes his points stick.



John E. Clark

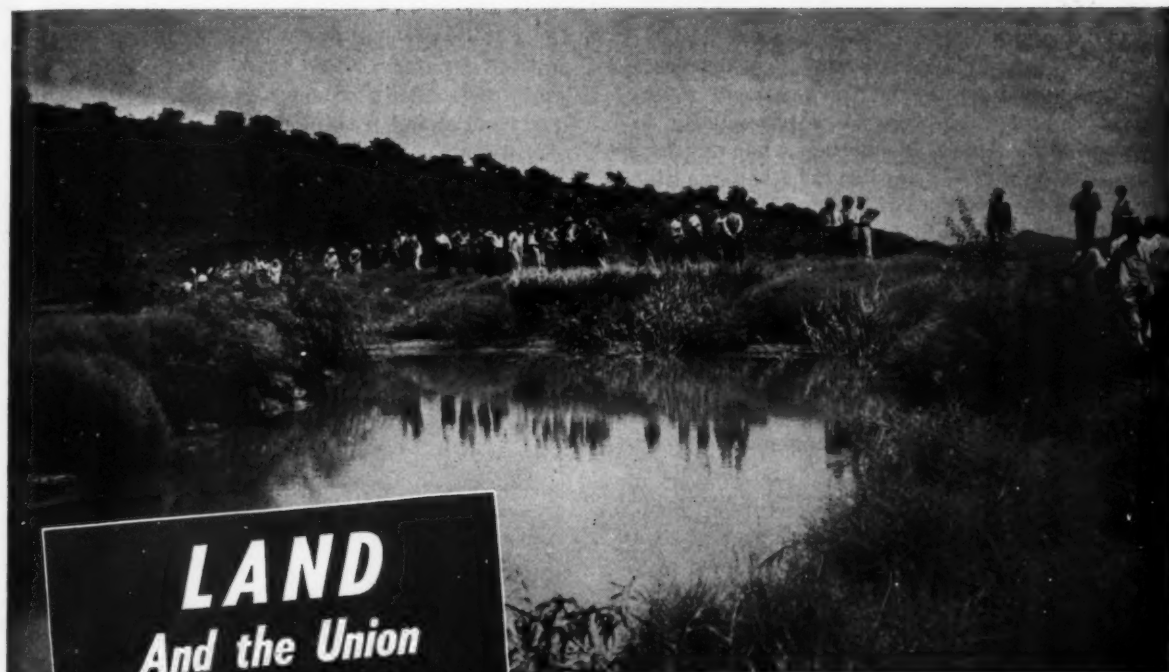
He shows a slide of heavy soil deposition washed onto a road from a cultivated field. "It cost you taxpayers \$200 to clean off that short stretch of road," he says. "But that's only part of the story. Unless the farmer protects that field he won't be a good customer of yours much longer. . . .

"See the difference?" and he throws another slide on the screen. "There's no soil on the road here—this farmer has his field terraced and contour strip-cropped. What's more, he's the man who can buy what you have to sell and whose land will always be able to provide you with the real necessities of life. . . .

"This muddy stream drains through an unprotected and eroding area. No fish can long survive in this soup. Now look at this sparkling stream just a few miles away. Its watershed is protected by trees and grasses and all the cultivated land is on the contour. Isn't that a valuable community asset?"

Another slide. "This field looks pretty and green as we look at it from the road. Let's go closer. Now here we're in the field. See that irregular pattern of openings? The crop grows thin, there, or not at all. In those spots most all of the topsoil is gone and before long they'll be gullies. And then the buying power of another of your cus-

(Continued on page 47)



LAND And the Union of South Africa

By Hugh H. Bennett

Earth dam walls planted
with grasses and trees
Vlekpoot area.

The article which follows is taken from Survey Graphic for May 1945, by permission of Paul Kellogg, Editor. The issue in which it appeared was devoted to "The British and Ourselves"—the tenth in the "Calling America" series.

Of Author Bennett's contribution, the magazine comments, "His is a variant from other regional articles in this number—an exhibit of scientific interplay, American and British.

"Along with Mr. Bennett's federal service since 1903, have gone kindred exploratory expeditions to Alaska, the West Indies, the Great Plains drought area, to the Canal Zone and Cuba, Central and South America. He bore a major part (1941-42) in the Pan American Conservation Commission.

"From another angle, he throws new light on the dream for 'peace on earth.' On every continent, what is done, or left undone, with the 'earth beneath' becomes of prime significance in underpinning the peace."

In addition to the Chief of the Soil Conservation Service, the distinguished authorship of this outstanding issue of Survey Graphic includes Winston Churchill and Ambassador John G. Winant.

All too often, the last natural resource which a nation decides to protect is soil, although that is wholly indispensable to the life of its people. In the Union of South Africa, happily, there is promise that something positive is going to be done about it.

Last year, when I went there to consult with officials of the Union Government on soil erosion,

I had been given to understand the dominion's problem was a dangerous one, and getting worse. I knew, too, that a special drought committee had made a searching study of the Union's land situation as far back as 1923 and had issued a major report warning of the seriousness of erosion.

Traveling over the country twenty-one years later, I soon learned how many, and how much,

South Africans were concerned about the widespread damage which had gone on for two decades, and the toll it had exacted of millions of people.

Everywhere I went—and I ranged over a very large share of the country—people eagerly inquired whether American experience had anything to offer in the way of remedies for what was literally “eating the heart out of the land.” There was a noticeable impatience for action; complaints that “There is much talk but little done” to arrest the speed of erosion. Others lamented that the country had fallen into the habit of appointing commissions “to study our problems, write reports, print and distribute them, and then forget the whole thing.”

“South Africa in Danger”

Nonetheless, the country was not without its own prophets. A stirring motion picture of uncontrolled erosion—“South Africa in Danger”—was being shown all over. This had been filmed by C. J. J. van Rensburg of the Division of Soil and Veld Conservation—who knows every nook and corner of the Union and has done much to awaken people to a menace which had grown progressively worse since the Twenties, when the Drought Investigation Committee had driven home:

—“That soil erosion is extending rapidly over many parts of the Union.

—“That, besides slooting (gully) there is a great deal of surface erosion, both by water and wind, taking place.

—“That the soil of the Union, our most valuable asset, irreplaceable and definitely limited in amount, is being removed in enormous quantities annually.

—“That a great part of this soil and valuable plant food is lost forever . . .

—“That great damage is done by the eroded material silting up reservoirs and that soil erosion causes greater irregularity in the flow of our rivers, thereby increasing the cost of irrigation work . . .

—“That soil erosion is causing a marked decrease in the underground water supply of the Union, and thereby increases the difficulty of watering stock . . .

—“That soil erosion has a cumulative character which . . . accelerates its rate. . . .

—“That prompt action is therefore imperative.”

Meanwhile, agricultural experiment stations in South Africa had acquired much practical information about effective anti-erosion measures, especially in combating widespread damage to range land through improper stocking. Notwithstanding

these efforts to better conditions—chiefly educational—I soon discovered the existence of two sinister situations I had hoped not to find. These were: active erosion on almost all agricultural land; and all but nothing done to stop the damage.

The Sin of Sheet Erosion

It seems strange that agricultural specialists traveling widely about the world have seldom reported adequately on the extent, location, quality, and condition of productive areas. Fingers of warning have often been pointed at China as the world's outstanding example of horrible land debauchery, whereas the earth virtually everywhere is handicapped by countless tracts of erosion-impoorished land.

Perhaps this is accounted for by a common lack of understanding of the disguised violence of much erosion, its deterrent effect on agricultural production, and even more on health and human welfare.

Anybody who looks about him can readily enough recognize erosion at work in yawning gullies. Some of them are hundreds of feet deep; and a glance shows why such lands cannot be cultivated any further. What many people don't see, however—and therefore don't understand—is the effect of what is called “sheet erosion,” a less spectacular form which has gnawed away the foundation substance for millions of the world's people.

The reason why so many people are unaware of its disastrous effects is that they do not distinguish “topsoil” from “subsoil.” It is high time that human beings be informed, from school days on, that topsoil is the productive surface layer of all land, generally no thicker than 8 to 12 inches. Subsoil is the material lying immediately beneath it—*poorer*, less retentive of rainfall, more difficult to till, and, to use a less familiar term, more erodible. Every rain heavy enough to cause water to run downhill across unprotected slopes removes a thin layer of topsoil. This is carried away in suspension, as so much “mud” in the run off. The process may affect large areas so uniformly, so gradually, that even farmers fail to recognize what is happening and accordingly do nothing about it.

This erosion process is not just a technical item of hydraulics or a simple matter of the mechanics of farming. People don't go out and wilfully destroy their farm lands by swapping good soil for poor. Nevertheless, failure to recognize the deadly meaning of erosion and the utter necessity of stopping it is, I think, not only the most ignored but the most upsetting sin of man. It has been gen-



Gold coast strain of Napier fodder at Westfalia.

erally overlooked across the centuries—left out of our serious economic and social considerations, out of our conferences and discussions, national and international. Yet it probably lies closer to the roots of human want, fear, and strife than all other causes.

There are two other things most people, South Africans included, have not clearly understood:

- (1) that food comes from productive land and nowhere else; and
- (2) that productive land around the world is already scarce and getting scarcer.

Bare Footholds for Livelihood

In many places throughout South Africa I found that much formerly good land had literally washed—shall I say—from beneath dense concentrations of natives.

Thus, one very large area in Natal that I examined in detail presented the pitiful spectacle of completely devastated land, with both soil and subsoil washed off down to bedrock, and the people

generally stranded. Some were going considerable distances from their huts on the wrecked land to find diminutive parcels of ground for growing corn—their staff of life. Some men were trekking hundreds of miles to work in the mines of the Rand district about Johannesburg. Many of these people were not just undernourished, they were underfed.

What makes the problem even more difficult is that good land to which they might be moved is getting scarcer all the time. What gives it a silver lining of hope is that the wind and water erosion which causes it could be controlled rather easily.

Many of these wrecked areas are on "labor farms." The land on such tracts is turned over to natives by the owners to do with as they please, without rental or charge, other than that sometime during the year they must contribute half their time in labor on the owner's nearby or remote farm.

Thus, part of South Africa's irreplaceable resource of productive soil is actually being used, per se, as a medium of payment for farm work. The native, knowing nothing of modern methods of soil conservation, habit-formed to ancient ways of wasteful farming, allows the soil to wash off—often, in reality, more rapidly than he could dispose of it by loading dirt on a truck and hauling it off to a dump.

In another locality—the area between Pietersburg and the Drakensberg highlands in northern Transvaal—we found a solid block of more than 100,000 acres of good land, formerly used by natives and Europeans, which had been literally stripped of its topsoil. Here, as in thousands of other places, nothing whatever was being done to hold the soil against wind and water.

Cultivation generally is performed without regard for the contour or soil-building crops. Animal manures and cornstalks are used for fuel; and every vestige of crop residue left in fields is grazed down to the bare surface of the ground, leaving the soil exposed to the lash of wind and water. Present yields of corn on such land range all the way from nothing to about 3 bushels per acre—not enough to sustain life.

From Free State to the Great Karoo

In the Orange Free State we traveled over 200 miles along main highways without seeing so much as a single field in which any kind of soil protection or soil-building rotation was being practiced. And this was in a region where good land is suffering extensively from erosion.

Far to the south, toward Capetown, destructive erosion is under way over practically the entire regional wheat belt. Formerly the best wheat lands of the Union, many of them had had to be abandoned because the soil had been so thinned down over the basal rock that it was no longer deep enough to plow. The wastage in remaining fields is faster than ever.

Over a large part of the Great Karoo, a shrub-covered region lying between dry or desert country to the west and the eastern section, with its higher rainfall, erosion is fast spreading disaster over millions of acres. This region is famed for the easy fortunes that once were made here in sheep raising. Only where the land has been wisely protected is it good sheep country today.

Never before have I seen more land mismanagement than on the hills and mountains slopes of the Karoo. These highlands have been burned so repeatedly and over-grazed so long that the natural sponginess of the ground has been practically destroyed. Rain formerly soaked into retentive vegetation. Now it runs off as from a metal roof, spreading sheets of torrential flow over the nearby flat lands. Thus the topsoil has been swept from a vast area, where to begin with, it had only shallow depth over rock.

As speedily as possible the highlands of the Karoo—as well as most of the other hill and mountainous areas of central and eastern South Africa—should be acquired by the government, fenced and protected against fires, and grazed under the most careful restrictions. Some areas should be planted to trees. It is still not too late to bring back some degree of former well-being to the region.

In general, bad conditions of erosion are so prevalent that there must be put into effect, without more delay, a really vigorous national soil conservation program, if South Africa is to survive in any sound agricultural sense. About half of the virgin fertility of the land has been lost—and the rate of erosion is increasing. Three or four more decades of doing nothing (beyond offering farmers payments for this or that) will see the southern half of the continent fading from the scene as the seat of a vast community. There may still be diamonds to mine, and gold there, but these have no nutritional value.

Erosion Control

Control of erosion calls for the treatment of land according to its adaptability and needs through the use of scientifically applied measures. There are no short cuts about the job. No two

farms are exactly alike so that formulas, like those used to build small dams on almost any stream, are of no avail in this complicated task which is to control water and wind on land of complex soil and topography. Most farmers do not have the special training needed for installing, for example, efficient water control systems or a good enough layout of wind-resistant strips of vegetation.

Individual farmers can be required to abide by certain practical rules in the operation of their farms—such as burning the carcasses of animals that have died of contagious diseases. But proposals to force them to control erosion in an over-all way amount to little more than nonsense. In countless instances—generally, in fact—they do not know what to do; they need technical assistance. This assistance the government should provide as its rightful share of the job of keeping land permanently productive for the permanent welfare of the nation. It may not be safe to bet heavily that other nations will always be willing to sell off their irreplaceable soil productivity in the form of food crops for export.

The job of erosion control is not so complicated, however, as to be in any sense impracticable. As a matter of fact, it is easier, cheaper, more remunerative, to farm with conservation measures than by the ordinary wasteful ways. It takes less gasoline and less time, for example, to plow across slopes on the level—on the contour—than to plow up-and-down slopes; and it is also easier on animals and men to plow on the level. Moreover, per-acre yields are increased with conservation farming, and this means more income to the producer.

I pointed out to members of the staff of the South African Department of Agriculture, Native Affairs, and others interested in conservation matters, that their job should prove considerably easier of accomplishment than ours has been in the United States. Smoother slopes prevail and there is greater variety of useful, soil-improving, and soil-holding grasses available under almost all conditions of land, slope, and rainfall.

South African Demonstrations

Traveling about, studying the country in detail, brought us into contact with occasional farmers who had sought and made good use of the advice of South Africa's capable technicians. On their lands we found excellent examples of erosion control on field and range.

One Transvaal farmer—Dr. Hans Marensky—has contour-planted on a rather large scale and



Top: Left, natives at Aliwal North, Eastern Province; right, reclaimed donga, Ladybrand, Free State.

Middle: Left, wheat fields, Caledon, Cape Province, all of them sheet-washing though not so rapidly as on steeper slopes; right, donga eating through the mountains, Free State.

Bottom: Left, note great depth of alluvial soil in some parts of South Africa's Karoo. This 25-foot gully was formed in such soil by the increased runoff from mountains that have been stripped of water-holding plants and spongy topsoil by burning and overgrazing. Right, natives carrying tall Cymbopogon for thatching.

obtained excellent results in growing citrus fruit, avocados, and bananas, with conservation farming. By returning to grass and indigenous growths those worthless slopes that had been abandoned because of erosion, he has not only restored the land to a condition favorable for grazing but has brought back to life springs and streamlets that had gone dry. And the water thus held back from the heavy flood-flows coming off eroding land is now being used downstream for stock water and for the production of feed needed to carry animals over the dry period of late winter.

In Swaziland, we saw some highly successful work done with contour-embankments and even more of this in Basutoland, where the farmers are mostly Negroes. Specialists, some of whom had spent considerable time studying our methods in the United States, had returned to Basutoland and helped the natives start an extensive program of soil and water conservation work which already has pushed corn yields up from around 3 bushels to 12 to 15 an acre.

I asked one of the Basuto chiefs how his people like this sort of work. He said: "We were scared of it at first; we didn't understand. Now we have seen the good of it and consider it a blessing. It not only prevents the formation of dongas (gulches) but gives us more to eat."

So I said to my South African co-workers: "Look! You've been talking about unsolvable, moderately difficult, and intermediate problems of erosion while, here, stretched out before us are 10,000 acres in a solid block where Europeans and natives, helping one another, have completed a splendid job of modern soil conservation. If they can do it, why not you South Africans?"

From the Ground Up

On my arrival in the Union, I had let it be known how much I preferred to base any suggestions on outdoor studies of the land rather than on bulletins, reports, or discussions about tables, whether round or square. My proposal was accepted and I was invited to speak out in any critical way I wished.

This I did, and it helped us to develop and present at least the framework of a plan for going ahead with a comprehensive, national program for the conservation and wise use of South Africa's agricultural lands. This plan cannot be given here, but it was based to a considerable degree on the national soil conservation program which has proved its worth in the United States.

If adopted, this plan will succeed and it will

help solve, also, some exceedingly difficult human problems—some of them so tough that most people have tended to look at them and leave them alone, or branch off into a lot of academic, political, or impractical theorizing.

The most fundamental characteristics in the whole social economy of South Africa, is its dwindling agricultural productivity. The great masses of people—the eight or ten millions of Negroes—live on and by the land, and yet in some provinces they cannot even own land. The matter of land ownership could be arranged politically, but the productive soil, now eroding away so rapidly over most of the country, cannot be handled politically or in any other way *after it's gone*.

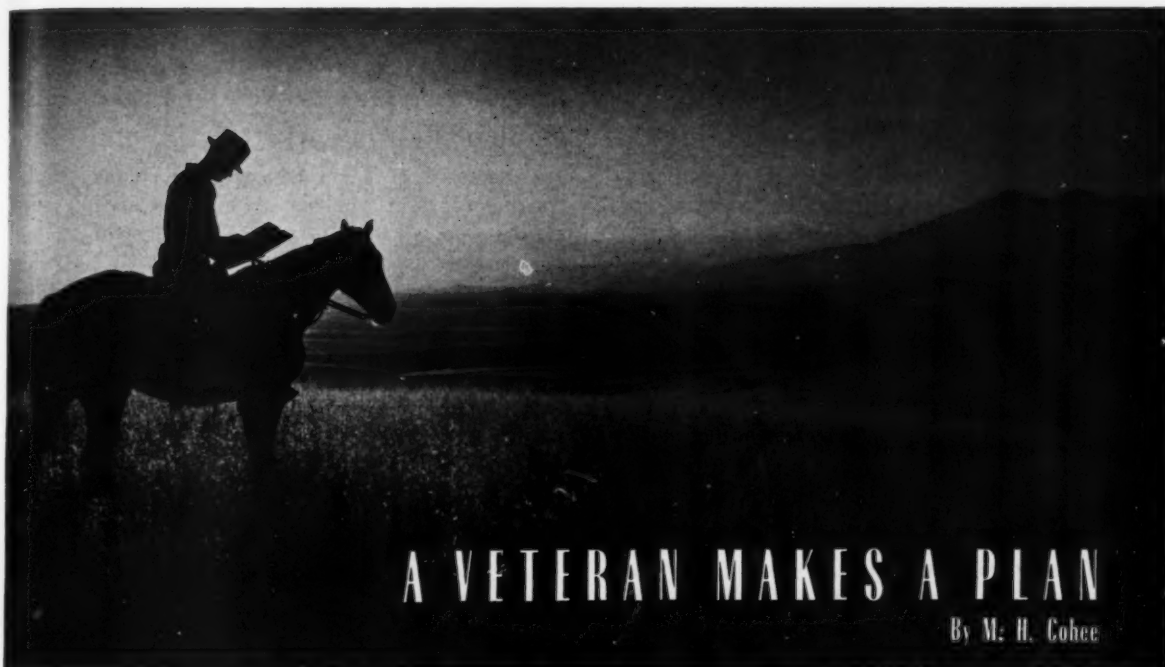
Already there is acute need to move thousands of people from wornout land to land where there is a chance to grow something. Resettlement of this kind, necessary as it is in the numerous impoverished localities, is difficult under any circumstances. Reasonably good land available for settlement is already scarce in most sections because the land impoverishment and wreckage by unbridled erosion has been going on for too many years.

This problem of land for people indeed is a tough one—so tough it is heading the country steadily toward an impossible situation. There will have to be a reckoning sometime, and that may not be as far off as those who trifle and delay with so dangerous a matter seem to think. For there is a tendency to let things drift in the hope that the situation cannot get any worse and may somehow get better. This attitude is pure delusion. Clear-thinking people in South Africa understand that the so-called insolvable problems themselves are not just drifting; they know they are getting steadily worse.

I advised my South African friends, with every persuasion at my command, that they should at least save their remaining area of productive land. That alone might go a long way toward solving their most immediate, troublesome and dangerous economic difficulties; might avoid a lot of political difficulties.

There is a relatively small but mounting number of South Africans who know that the life of the nation depends on saving its agricultural lands. Diamonds and gold are precious things to have—and they have them—but they understand that the country has on its hands, also, plenty of deep-seated, smoldering social and racial trouble, a good deal of which is unnecessary.

(Continued on page 45)



A VETERAN MAKES A PLAN

By M. H. Cobee

Typical production unit nearly everywhere is the family farm. Each farm, each ranch, is virtually a complete business entity. Four items largely govern its activities: land, labor, capital, management. Its system of conservation farming is determined further by the interplay of physical factors, economic considerations, and the human element. Farms, operators, market prices, production costs vary in detail with each county, each community, indeed each R.F.D. mailbox. We can go only so far, therefore, in generalization. Only up to a certain point can soil conservation be considered with farmers by groups.

Thus, at the outset, the soil conservationist should recognize that even the well established farmer must weigh many things before changing his business to incorporate the desired soil and water conservation measures. In this respect, the picture with regard to a returning veteran is little different from that of other farmers in the community where he proposes to root himself in the land. The chances are more than 50-50, however, that the farm-bent veteran will take up farming within a soil conservation district, in companionship with approximately 3,400,000 other farmers now within 1,350 districts.

These local units of government, soil conservation districts, have as their purpose the conserva-

tion of soil and soil resources and the prevention and control of soil erosion. They have much to offer in the way of advice and help to the returning veteran and other farmers in the district who want to farm the conservation way.¹

AN APPLIED SCIENCE

The veteran has heard of "conservation farming," and wants to understand more fully what it means.² Just how can we explain? We can tell him that soil conservation is one of the newest applied agricultural sciences. Further, we can state its basic, guiding principle as follows: "Effective prevention and control of soil erosion and adequate conservation of rainfall in a field, on a farm or ranch, over a watershed, or on any other unit or parcel of land, requires the use and treatment of all the various kinds of land comprising that area in accordance with the individual needs and adaptabilities of each different area having any important extent."¹ He will then want more specific, concrete information as to methods of developing a farm or ranch conservation plan.

The veteran-farmer might well remember that in a soil conservation district today—where several agencies are assisting a district with its work

¹ Guidance to veterans going into farming is treated in "Soil Conservation Districts and Returning Veterans," May issue *Soil Conservation*, by the author.

² Chapter 10 in the booklet "Managing a Farm," November, 1944, prepared for and used with armed forces by The United States Armed Forces Institute, treats the importance of soil conservation to the success of farming.

NOTE.—The author is Chief, Project Plans Division, Soil Conservation Service, Washington, D. C.

—the expression **farm conservation plan** does have a definite connotation. All the phraseology used to describe this meaning merely reflect the basic guiding principle stated above.

ESTABLISHES COURSE OF OPERATIONS

The concept of the farm conservation plan was developed some years ago by the Soil Conservation Service. It has been adopted in principle by practically every soil conservation district in the country, and is well understood by thousands of farmers. Such criticisms as may arise usually are about methods, or tempo of operations, rather than about fundamentals. But farming itself is not simple or standardized. And we cannot apply any rule-of-thumb in appraising the physical characteristics of each acre and each field, in considering the economic aspects of the farm business, and in adjusting a plan to the aptitudes and desires of the tenant or owner.

The farm conservation plan has soil and water conservation as its central arch. This immediately distinguishes it. Like most plans, whether for industrial enterprises, urban retail stores, or a host of other businesses, the farm conservation plan is not an end in itself. The real objective is for the farmer to make a creditable living for himself and his family, and at the same time treat his land in such way as to assure continued economical production. The farm conservation plan is the outline of a course of operations designed to safeguard the producing capacity of the land, hold the soil in place, and insure a "going business."

The farm conservation plan starts from two broad bases: 1. the existing plant, 2. the obviously needed changes in use. The physical plant is gauged according to the land capabilities of each acre and with an eye to present usage. Needed changes—conservation measures—are dictated by sound management, economic feasibility, and the aptitudes and desires of the farmer himself.

Practically all the desirable agricultural land of this country is now in farms or ranches. There is small opportunity to develop a farm conservation plan for land never before in a farm or ranch. Usually, planning pays its dividends through invoking changes in already existing operations and management. Now and then, however, farms are divided or combined; the farm conservation plan then becomes an essential tool in the shaping of a virtually new unit. Whether the owner or operator is now on the farm or is a veteran just coming onto the land, the principles remain the same. Conditions are inventoried and a pattern of operations developed which includes adequate conservation

measures. Rarely would it be possible for the professional agricultural worker—even if that were desirable—to develop such a pattern alone and come out the same as when the farmer takes part.

PEOPLE LEARN BY WRITING AND READING

Discussion of farm conservation plans sometimes centers in whether or not they should necessarily be reduced to writing. Why do people ever write? They write for convenience, when verbal conversation is not practicable at the moment. They write as an aid to the orderly arrangement of ideas. They write to produce information for record.

Once a farmer has his farm conservation plan well in mind or applied on his land, he may not greatly need a written plan. Nevertheless, the writing of the plan helps tremendously in getting the proper operations, singly and in combination, on the face of his property. He has the written plan at his elbow for frequent consultation while the measures are being installed or maintained. Better yet, he finds it useful to agencies and individuals helping on his farm and other farms. And should he sell or lease his holdings, the plan becomes a part of the "value received"—a guide to those who will carry on. The farm conservation plan, therefore, stands first as a written document, and second, as the living means for putting conservation on the farm and keeping it there afterward.

EXAMINE LAND AND COVER

Many are the "tools" useful in formulating the farm conservation plan. They vary, farm by farm, ranch by ranch. First, comes knowledge of soils and topography—each acre, each field. Are the soils deep or shallow? Is the land badly eroded, moderately worn, or but slightly damaged? What is the slope here—there—yonder? What of water disposal, use-pattern, drainage, gullies? All such information—and more—goes into the making of a land capabilities map. This map puts the land into one or more of eight classes, depending upon (a) its suitability for cultivation or other uses such as grazing, woodland, or wildlife; and (b) the need for intensity of conservation measures—such as cover crops, strip cropping, terraces, and so on. Range land is tabbed according to the grazing conditions—reflects the range. Condition classification establishes the degree to which a given grazing area approaches full potential productivity.

Armed with this inventory of physical information, the needed land use can be outlined for each

field or other part of the farm or ranch. This is not to say that at this stage in the formulation of the farm conservation plan all of the indicated land uses and conservation measures will be included.

GOOD FARM ORGANIZATION IMPORTANT

Next, we take a look at the economic aspects. What are the farmer's present cropping and grazing programs, his equipment, his buildings and water supplies and fences. In short, how is the farmer or rancher using his land from a business standpoint, and what working resources are involved in present operations? It is to be remembered that there is great rigidity in the production program of the usual farm—there is a relatively high percentage of fixed expenses. The practical farm conservation plan will adapt itself to the hard realities and call for a sensible sequence of changes.²

The present organization and management of the farm will largely shape the nature and extent of the transformation to be wrought. Into account are taken the possibilities of broad production adjustments and "outside the farm" influences. Long time shifts in market demands and outlets, as well as changes in costs of production because of technological improvements such as equipment, new varieties of seed, improved or new uses of fertilizers, etc., should not be overlooked.

THE FARMER RUNS THE FARM

Last but not least in importance, is the farmer himself and his family. The farmer may not desire or be able to take advantage of the most promising farm conservation plan ever devised. He may not have the necessary experience and background to draw upon the production of a new crop or for the establishment of certain livestock enterprises or for the application and maintenance of a conservation practice. Furthermore, he may prefer not to grow a certain crop or have a particular type of livestock or maintain a conservation practice—for example, many farmers do not want dairy cows because they do not like to milk or because they do not want to be subjected to the year-round routine of caring for the herd and milk equipment. Consequently, the planning of the land use and cropping pattern must take into account the entire farm organization possibilities not only from a physical and financial view but also because of the farmer's desires and abilities, and those of his family.

The present farmer, or the veteran who is establishing himself as a farmer, then, with information along the lines of these three groups of factors, and with assistance in the interpretation of the facts, can decide upon what his farm conservation plan shall be. It may not be perfect at all. With the shifts in demands for agricultural farm products (and this will undoubtedly be true after the war) and with changes in prices and production costs, there will have to be modifications in detail. This very moment is one of the best times to prepare for future changes. For those parts of the farm or ranch on which, because of physical conditions, the desirable land use and conservation measures are well fixed, the farmer right now would be wise to make a decision looking far ahead—make up his mind to get such areas under a permanent program. There may be other parts of his farm subject to alternative uses—uses involving the intensity of cropping, or shifts from crops to grazing and back again. On these areas treatment may be applied which will allow flexibility.

The farm conservation plan should permit all likely contingencies. It does not necessarily follow, however, that the farm conservation plan should include every detail pertaining to the management of crops, livestock, and marketing. Nor does it deal with the intricacies of home economics or home management, although it takes into account, perhaps, the location and size of the farm garden, together with the necessary conservation practices. Specific vegetable and canning recommendations are omitted. Far too frequently, however, the erroneous conclusion is drawn that the omission of such specifications means that only the physical factors enter into the formulation of a farm's conservation plan. Farmers themselves rarely share such confusion.

Sometimes it is proposed that all kinds of farm plans should be molded into one—a lengthy, comprehensive document blanketing the need of the farm, the farm family, and the farm business. This would be comparable to writing an all-over insurance policy covering automobiles, life, personal accident, education, fire, and crops. Such farm plans have occasionally been attempted in the past, only to fail by their utter impracticality—always they have been out of balance, cluttered, wasteful of effort, universally disappointing. Farmers as a rule are fair'y good business men. They run their farms not too badly. They do not need every phase of their business spelled out to the last detail. Their wives, too, are probably above the average as household managers, and do

² Two articles in the May, 1937, *Soil Conservation* go into some detail in these economic aspects, "Farm Management Information Needed in Farm Planning" by E. H. Reed, and "The Application of Farming Management Data in Farm Planning" by Melville H. Cohee.

not need to be told how to parcel their time or attention.

A FARM CONSERVATION PLAN

Conservation of the soil, and the conservation, use, management and disposal of water, are so intimately associated with each other that the farm conservation plan must necessarily take both soil and water into account.⁴ Space does not permit the citation of examples of a farm conservation plan for each broad area of the country having significant differences. In broad outline, the farm conservation plan is the same in its concept and execution in humid and subhumid regions, in the Cotton South, in the New England dairy region, in the corn-hog Middle-West, in the Great Plains grazing country and in the Pacific Coast citrus-growing sections.

Take, for example, an 80-acre farm in the Cornbelt. Joe Thompson, just released from the armed forces, has selected this farm for his own. It is just a little smaller than he had wanted, but perhaps later on he will add to it. This returning veterans wishes to know what are the physical characteristics of each of his newly acquired acres. He has the general picture, but in building his farm conservation plan he must have a breakdown of definite information.

His soil conservation district will provide technical assistance. Soil Conservation Service men are assigned to it for that purpose. One of these men will make a conservation survey of Joe Thompson's farm. (Figure 1.) Serious erosion has taken place in the small northwest meadow field, in the northeast corner, in the southeast corner, and also right in the middle of the farm on land partly in cultivation and partly in pasture. These areas are rolling or steeper than some other parts of the farm. The soils are far from being worn out, however; some, in fact, are of the same type as on other parts of the farm not damaged so badly. Tama silt loam predominates. The surface soil is dark, grayish-brown, silt loam—when wet it appears almost black. The subsurface soil is a dark, yellowish-brown silty clay loam. Both soil and subsoil are acid. Natural drainage is good throughout.

On a conservation survey map is delineated each part of Joe's farm which differs in combination

of four things, namely: (a) degree of erosion, (b) present use of the land, (c) slope, and (d) soil type. For convenience in use, and ease of understanding, it is most common now that upon the basis of these factors the farm be delineated into different areas on a map according to land capabilities. (Figure 2.) The draws and serious gullies are also mapped; likewise, the present field boundaries, as well as certain other features.

Immediately this information supplies a land-use guide to the soil conservation technician and to Joe Thompson. From it, they see at once the southeast corner of the farm should go to trees. They know, also, that with improved management the present permanent pasture area may be retained. The drainageways need treatment—they are seriously eroding, and the lack of production from such areas constitutes an ill-spared part of the farm business. In fact, one of the drainageways needs more than vegetative protection at the lower end—it needs a dam.

The technician and Joe Thompson talk it all over. Joe feels that he must farm somewhat intensively if he is to have enough feed to take care of the cattle he wants and needs to keep, and to maintain a few hogs, some chickens, and two horses. He does not feel, therefore, that he can follow one alternative course of treatment on the suitable cropland area, namely, a crop rotation in strips on the contour that would call for two or more years of hay out of each four. There simply would not be enough corn or other row crop, no matter how desirable as a means of maintaining soil fertility. Joe understands the principle of strip-cropping, however, and decides that this practice will be necessary, and since he will have a medium size tractor, it will work out all right.

Joe has another option open. He and the farm conservation planner soon get on with it. They decide to terrace the north part of his cropland—in fact, it really needs terraces anyway. The crop fields south and southeast of the farm buildings lie level to undulating and contour strip-cropping will serve those lands well, even with a relatively short crop rotation. Thus it is that Joe Thompson can raise the needed row crops each year to round out his livestock feed requirements. Three of the more seriously eroded areas of cropland, also in the proposed contour strip-cropping system, prove to be "odd shaped" fields or parts of strips, and are allotted to permanent alfalfa.

Joe Thompson will build his own terraces after they are staked out by the technicians of his soil conservation district. He not only wants to prevent paying out-of-pocket cost for this work, but he

⁴ The inter-related importance of water and land is apparent from two articles appearing in the January, 1940, *Soil Conservation*: "The Water-Facilities Program," by Karl O. Kohler and James A. Muncey; and "Our Drainage Problems" by John G. Sutton.

⁵ Illustrations from different parts of the country are carried in an article "The Coordinated Approach to Soil Erosion Control," by E. J. Uitz, 1938 USDA Yearbooks of Agriculture. Also see previous issues of *Soil Conservation* as follows: September, 1937—"Farm Planning" by H. C. Diener; December, 1936—"Looking Down a 5-year Road in Southwestern Ohio" by Wellington Brink; March, 1938—"How I Plan to Use Experience Acquired in an SCS-CCC Camp" by Cecil Giesler.

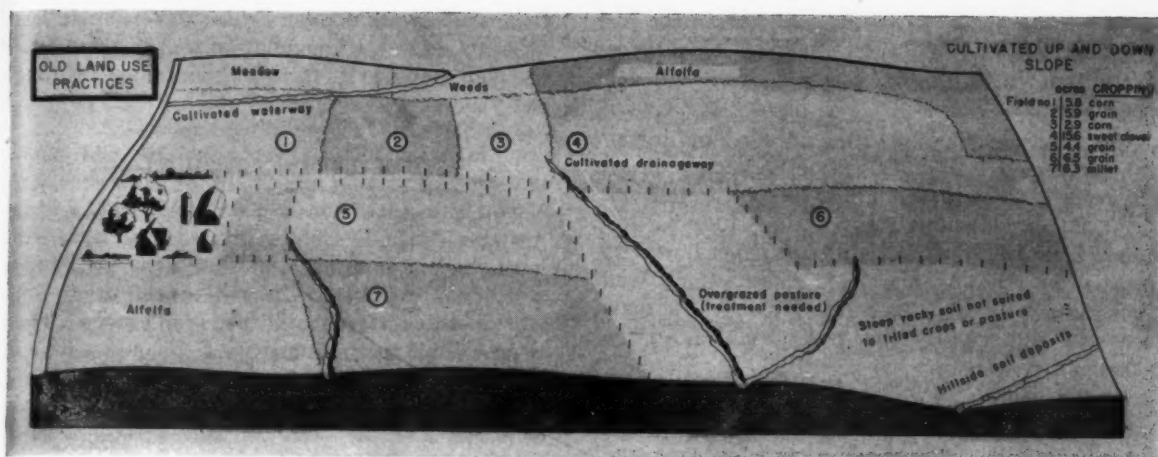


Figure 1.—This is the farm, as it was before conservation planning.

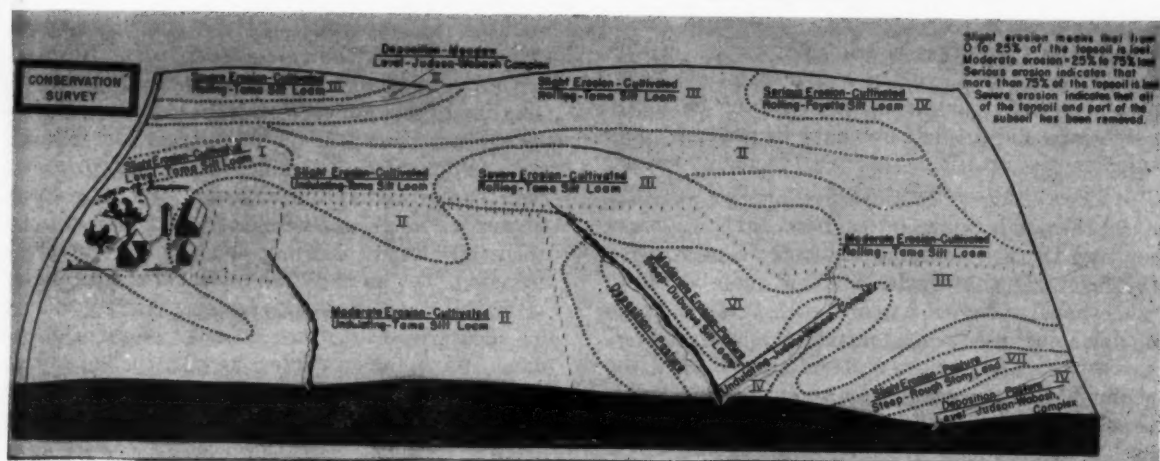


Figure 2.—First step was to map the land according to its productive capabilities.

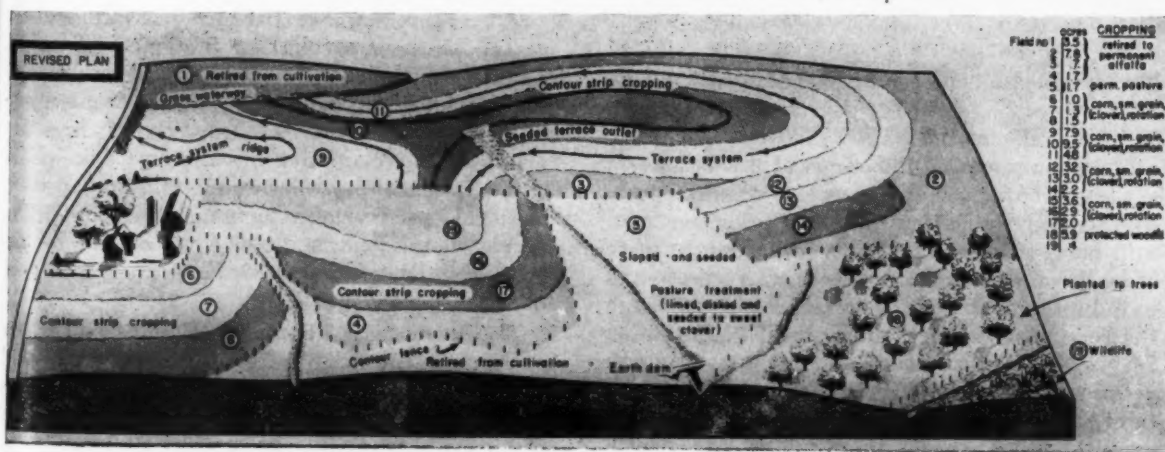


Figure 3.—The new plan, shown here, fits the use to the land. Soil conservation aims to assure the future of this farm as an economic unit.

wants the experience. Joe believes that since his farm contains but 80 acres, he may have some extra time to do custom terracing work for his neighbors.

The proposed small planting of woodland in the southeast corner of the farm bothers Joe a little. He feels at first that it might be better to have these six acres in pasture. After studying the conservation survey information further, however, he realizes that on this steep, rough, stony land there is not likely to be much grazing. Furthermore, he will require fence posts, and there is no woodland on the farm at present.

Another bothersome problem hinges on the grazing of crop residues and aftermath. It would be impracticable to have permanent fence on each side of every strip. For the present it is decided to use electric, portable fencing whenever it is desirable to turn livestock onto cultivated fields. Perhaps in the future a field unit system can be developed so that with a longer rotation, some first-year and fourth-year hay will be on alternate strips and the field unit may be used for some summer pasture—but this will probably not be practicable until Joe enlarges his farm.⁶

All these things are jotted down as Joe Thompson and the soil conservation technician go over the farm. The future farm layout map begins to take shape. (Figure 3.) For each field, or group of fields (strips) being treated as a unit, a brief narrative statement is written. In this are the pertinent facts about the soil conservation practices to be carried out on all fields—crops, grazing, woodland, wildlife. Yes, Joe Thompson will have a small special wildlife planting for song and game birds—even though it comes to less than half an acre.⁷ The narrative and tabular parts of the written plan are commonly referred to as “the plan of conservation operations.” It by no means covers all the points taken up by Joe and the farm conservation planners.

Joe Thompson and thousands of other farmers get interested in soil and water conservation problems as they watch the work of different agencies. Still more of them are drawn in by the presence of local soil conservation districts. Irrespective of initial introduction and contacts whether through the Soil Conservation Service, the State Extension Service, the Agricultural Adjustment Agency, the vocational agricultural instructors—Joe and his family stand to benefit from the development of a

farm conservation plan. This “development” entails not only the formulation and application of the plan, but also its faithful maintenance through the years.

FLUID INSTRUMENT

The farm conservation plan is not rigid and immovable. Once decided by farmer or rancher what land shall be in cultivation and what in grass or woodland, together with soil conservation practices for each, it may still take 4, 5 or even 8 years to install all the measures. At the outset he may find himself with two groups of measures—1. those he intends to carry out just as soon as he can, and 2. those other measures recognized as desirable but which he may not be able to get on the land immediately. Then, with both groups of measures at work, there's still the obligation to maintain and improve. As the plan takes form, revisions and refinements are in order. Research has brought along many new methods and practices, and research will continue to pioneer along the conservation trail. Furthermore, Joe and his contemporaries gain confidence and wish to go farther than originally contemplated. Joe may decide to terrace some of the fields on which a fairly good job already is being done by contour strip-cropping. Or, he may find his farm profits falling in different pockets. Or, he may merely change his ideas regarding the intensity of farm operations. As Joe grows older, he may incline toward a shift in organization to a more extensive type of farming—want more hay, grass or woodlands.

EACH CONTRIBUTES TO WHOLE

Dr. Hugh Hammond Bennett has stated, “Appraisal of the importance of the land to national welfare demands consideration of the future and recognition of the land as a resource that needs to be defended forever in order that it may remain productive and continue to support the population. The land is owned and used by many men. National conservation action must spring from the people on the land, and to a large extent, be advocated by them as individuals, with the help of the government.”⁸

The farm conservation plan affords each farmer or rancher the “course of operations” that will safeguard his lands. As he follows this course he furthers the welfare of the nation as well as that of himself, his family, and his community.

⁶ See “Field Unit Planning” by Harry H. Gardner, April, 1941, *Soil Conservation*.

⁷ Wildlife benefits are definitely taken into account in the development of a farm conservation plan. April, 1942, *Soil Conservation*.

⁸ From *Soil Conservation*, H. H. Bennett, McGraw-Hill Book Co., 1937.

LAND

And the Union of South Africa

(Continued from page 38)

South Africa could not possibly do anything that would help the country so much as to put idle people to work rebuilding and stabilizing its land resources. This would improve land sorely in need of protection, and it would help utilize and conserve a great part of the nation's human resources. The immediate benefits to the people engaged in such a program would be outweighed only by the advantages that would accrue from such work itself across the long span of the future. The social and economic health of the Union of South Africa in the years to come is certain to be conditioned, in a most vital way, by the health of the nation's agriculture, of the millions who try to live by it today, the other millions that will seek the same livelihood for many tomorrows.

If the years ahead are to be years in which the nation steadily increases its importations of food and fiber to compensate for the dwindling productivity of its own land, and if at home there is increasing dependency by all on the gold and diamond mines for their livelihood, the years ahead will be years of mounting trouble.

Looking Ahead

I cannot believe the Union of South Africa will forsake agriculture. Something worthwhile and on a wide scale is bound to be done about erosion. Of course, something has already been done here and there—enough to prove its practicability. A number of Conservation Areas already have been established under conservation laws. The Drakensberg Area in Natal comprises 3,000 square miles of severely eroded land along the Tugela and Mooi Rivers. The pressing thing now is to adopt a nationwide plan. The call is for action.

You can neither keep land productive nor improve impoverished land except by action *out on the land*: by applying such proven measures as contour cultivation, water retardation and conservation, strip cropping and terracing; by such measures as rotation of crops with soil-building legumes and additions of animal manure and compost; by retiring steep slopes to the production of trees and grass, and so on.

In my last talk with newspapermen before I left the country, I couldn't resist saying: "If this nation doesn't awaken to its land responsibilities within the next two or three decades you will have lost the fertility of your soil—and then God help you!"

LEGUMES HARNESS BACTERIA

By JOHN P. JONES

Good farmers use vegetation for the threefold purpose of conserving soil and moisture, and of improving soil. Vegetation achieves soils stabilization which, in turn, permits fertility developments. Legumes work well with other vegetation, and we are constantly seeking new and improved varieties, because of their capacity to collect nitrogen from the air—a peculiarity which makes them invaluable as soil improvers.

Legumes collect nitrogen from the atmosphere by what is known as the symbiotic process. This process gets its name from the Greek word that means living together. Symbiosis involves the living together in more or less intimate union of two dissimilar organisms, and is usually applied to cases where the relationship is beneficial to one or both. The collection of nitrogen from the atmosphere by legumes is commonly called symbiotic nitrogen fixation.

The two organisms involved in nitrogen fixation are the legume and bacteria, scientifically known as *Rhizobium*, which live in the root cells of the host legume plant.

The nodule bacteria invade the roots of leguminous plants through the root hairs and set up housekeeping in the cortex. There they multiply and the cortical cells are stimulated to increase in number. This multiplication of the cortical root cells, resulting from the bacterial invasion, causes the root swellings known as nodules.

In the absence of nodule-producing bacteria, legumes possess no more capacity for fixing nitrogen than any other plant. It is therefore important that the proper strain or species of bacteria be present in the soil if the symbiotic process is to be effective and if the legume is to perform its full function in soil maintenance and improvement. Many soils do not contain the proper inoculating organisms and it is necessary to inoculate the seed artificially from fresh cultures of the particular strain of bacteria required. Seven groups of legumes have been recognized, each of which is susceptible to inoculation by specific bacteria. They are the alfalfa, red clover, vetch, bean, lupine groups, cowpea and soybean.

Legumes are not entirely dependent upon the symbiotic process for their nitrogen. In fact, even when inoculated, legumes obtain part of their ni-

EDITOR'S NOTE.—The author is chief, regional division of agronomy, Soil Conservation Service, Upper Darby, Pa.

trogen from the soil. They can grow in rich soil without forming nodules and fixing nitrogen. Under these circumstances, all the nitrogen required for growth is obtained from the soil. In general, it may be said that under average conditions, in a soil of moderate fertility, a well-noduled legume crop will take about two-thirds of its nitrogen from the air and one-third from the soil.

Estimating from available figures, a two-ton per acre yield of red clover, alfalfa, crimson clover, vetch, or cowpeas would collect in the top and roots approximately one hundred pounds of nitrogen from the atmosphere. Where the hay crop is harvested, however, an amount of nitrogen somewhat greater, in most cases, than that taken from the air by fixation is removed. The turning down of legume stubble cannot be depended on to increase greatly the nitrogen level of the soil. To add nitrogen to the soil it seems desirable to plow under a legume as a green manure some time during the rotation. Pieters, in his book on "Green Manuring," has quoted estimates of Whiting and Fred to show that if no more than 50 pounds of nitrogen per acre were fixed by the symbiotic process and 10 percent of the cultivated land in the United States were planted to a legume crop, 920,000 tons of nitrogen would be added to the soil every year. When you realize that the total nitrogen used in commercial fertilizers annually is only about 400,000 tons, the importance of the contribution of a wider use of legumes in soil conservation is at once apparent.

When it is fully realized what these microscopic bacteria that live in association with legumes can do, the legume will find even wider use in soil conservation work. Saving in fertilizer costs, stimulation of grasses, increasing the erosion-resistant character of vegetation, and providing a better feed for livestock are some of the results. The agronomists, of the Soil Conservation Service and of the State colleges can take pride in having enlisted these minute bacteria as an aid to the effectiveness of soil conservation practices.

PAID EMPLOYEES

Out of an appropriation provided by the State legislature, the Virginia Soil Conservation Committee employs a full-time technician to look after the purchase of machinery for soil conservation districts. It also uses on a full-time basis a soil analyst, and is one of the few State committees to maintain a part-time paid secretary.

HOW TO OBTAIN SOIL CONSERVATION MAGAZINE

Paid subscriptions are being accepted for *Soil Conservation Magazine* by the Superintendent of Documents, Government Printing Office, Washington, D. C.

With further free distribution impossible, many district boards of supervisors are purchasing the magazine at the regular rate of one dollar per year. In at least one instance a district board has entered a subscription on behalf of each cooperator. Business concerns and civic groups are beginning to buy gift subscriptions for clients and other farmers who will stand to benefit.

In many quarters *Soil Conservation Magazine* is looked upon as one of the essential tools of farm progress, along with machinery items and good seed. It tells what is going on in the districts, shares practical suggestions, explains new techniques, constitutes a meeting ground for the best thinking of authorities on various phases of soil and water conservation.

NOW THEY FIGHT FOR SOIL

There are at present in the Washington office of the Soil Conservation Service a total of 36 war veterans—35 of World War I and one, Captain George Dasher, of World War II. Headed by the Chief, they are—

Hugh H. Bennett

Benjamin H. Carr	Lewis A. Jones
Thomas B. Chambers	Frank Kimball
William O. Cousins	Walter C. Lowdermilk
Tom Dale	Howard E. Middleton
Harry C. Diener	Ethan A. Norton
Walter D. Ellison	John T. Olsen
John S. Fickling	Maurice J. Orler
Sydney D. Frissell	Oliver B. Perkett
Robert L. Geiger, Jr.	Gilbert B. Posey
Harry A. Gunning	William D. Potter
Robert B. Heenan	William C. Pryor
Carl M. Helgeson	Frederick G. Renner
Max M. Hoover	Robert M. Ross
Frank J. Hopkins	Guy R. Stewart
Cleveland W. Humble	C. Warren Thornthwaite
Eric A. Johnson	Russel E. Uhland
Anwel E. Jones	James V. Webb

World War II
George Dasher

REVIEWS

PLEASANT VALLEY. By Louis Bromfield. Harper and Brothers. 302 pp. illus. 2nd Ed. 1945.

Although this book—in reality a series of fascinating essays about the land by one who lives upon it and feels a moving kinship with it—is in no sense a technical work, it is of great moment to the professional soil conservationist. It is so because it brings closer the time when soil conservation will be commonly met with in our literature. And when that time has come, soil conservation will be in the lives of the people and have become part and parcel of our culture. The soil conservationist knows that then the most precious of all resources will be secure and our ultimate national welfare far more certain than it is now. Yet the book is not all about conservation of the soil. It is about Louis Bromfield, the Ohio farm he chose to come back to from abroad, the home he built there and how he cultivated the good earth to prove that husbandry is a matter of intelligence and science as much as it is hard work and tradition.

There is something comforting to us to know that an American who lived many years in Europe and Asia and who became a famous novelist and wealthy man by the fruits of his own hard labors at the lonely job of writing—that this man came home to find solace in a land where there is freedom and promise. He settled upon an eroded and worn out acreage badly injured by the kind of thoughtless farming that is all too common with us. And he made a house there and brought the land back to life. We need not say that he could do it because he was rich—hundreds of thousands of farmers in organized soil conservation districts throughout the United States are doing the very same sort of thing. And I think many of them would read Bromfield's chapters with a nod of the head and agreement that here too is a man who knows the soil and loves it, and all the things it produces—food to eat, trees and the cool woodlands they form, the quail in the fencerow, the horses and cattle, sheep and goats that thrive upon the land, and the people who live there. To the author these people are of primary interest and many chapters tell of the folks who once lived on the farm but are there no more and of others who still give it character and meaning. Nor is it right to say that Bromfield has just discovered agriculture. He wrote about this very country-

side in "The Farm," published in a siege of homesickness during his long sojourn of some 30 years in the Old World, and no one "without he was born and bred there" could have the feeling for country people, maple sugar making, wild flowers, honey bees, farm animals, and the very soil itself that is expressed in these pages.

It is not easy to review this book for it is not easy to translate the charm of masterful writing. Every one who has an interest in the land, however, should enjoy having the book where he can pick it up at odd moments to read snatches in it. He may often read longer than he intends. Well printed and nicely illustrated by Kate Lord's numerous line drawings, the book is neat and handy, in spite of its 300 pages. There are 17 chapters, and their titles characterize the book. Some of them are: The Return of the Native, Johnny Appleseed and Aunt Mattie, The Anson Place, The Plan, The Big House, On Being "Teched," The World Within the Earth, The Business of "Plowman's Folly," Of Green Hills and Valleys. The soil conservationist will be pleased to find compliments on the work he is doing and a chapter devoted to "Friends of the Land." Not too many men of affairs or men of letters have yet recognized his efforts, and the book is at once encouragement and challenge to the technician who has chosen to combine his professional talents with the efforts of farmers and ranchers so they may manage their land that it will continue to produce abundantly for them, their children, and their children's children.—Edward H. Graham.

PROFILE (Continued from page 32)

tomers will have been reduced and you will have lost another big block of your capital stock—the soil of this community."

Clark shows a slide of the Susquehanna Flats at the head of Chesapeake Bay. "The big ships used to come up here to load tobacco," he says, "Now look at it. Fifty thousand acres silted a foot deep between 1846 and 1938. In some places the silt is 18 feet deep. That's your soil down there, washed off the farms you depend upon to keep your community prosperous."

Thus speaks John Clark, soil conservationist. And everywhere he talks and shows his slides there's an upswing of public interest in a great cause. The editor of the *Bel Air Aegis* summed it up this way: "After seeing Mr. Clark's slides and hearing his personal comments, any alert farmer of business man realizes that the primary business of Harford Countians is to conserve and improve our land."

—HAL JENKINS

REFERENCE LIST ☆☆

Compiled by William L. Robey, Printing and Distribution Unit

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